

FIGURE 1

FIGURE 2a. Primers used to obtain sequences high-fidelity PCR amplification of human cDNA.

5 RAPF: GCGATAGGATCCTACTCGCGGGAGAAGAACCAGCCCAAGCCGTCCCCGA
 RAPR: GCGATAAACCGGTTTCTGCCTCGGCGCGAGCTCTGGAGATCCTGCCGGACAGGTCCT

 GAAF: GCGATAACCGGTGCACACCCCGGCCGTCCCAGAGCAGTG
 GAAR: GCGATACTCGAGTCAACACCAGCTGACGAGAAACTGC
10
 IDUF: GCGATAACCGGTGAGGCCCCCGCACCTGGTGCATGTGGACGCGGC
 IDUR: GCGATACTCGAGTCATGGATTGCCCGGGGATGGGGGCCCTCTTGG

 GDNF: ACAGTGACCGGTTACCAGATAAACAATGGCA
15 GDNR: ACAGTGCTCGAGTCTAGATCAGATACATCCACACCTTT

FIGURE 2b. GDNF fusion, substitution of RAPF with RAPBACF in RAP amplification of GDNF construct.

 RAPBACF: ACAGTGGCCATGGGGGGTTCTTACTCGCGGGAGAAGAACCAGCCCAAGCCG
20

FIGURE 3. Nucleotide and protein sequences of the RAP-GAA fusion

cttaccgccatgcggggtccgagcggggctctgtggctgctcctggctctgcgcaccgtg
5 ctcggatcctactcgcgggagaagaaccagcccaagccgtccccgaaacgcgagtcggga
L G S Y S R E K N Q P K P S P K R E S G
gaggagttccgcatggagaagttgaaccagctgtgggagaaggcccagcgactgcatctt
E E F R M E K L N Q L W E K A Q R L H L
cctcccgtaggctggccgagctccacgctgatctgaagatacaggagagggacgaactc
10 P P V R L A E L H A D L K I Q E R D E L
gcctggaagaaactaaagcttgacggcttgacgaagatggggagaaggaagcgagactc
A W K K L K L D G L D E D G E K E A R L
atacgcaacctcaatgtcatcttggccaagtatggctctggacggaaagaaggacgctcgg
I R N L N V I L A K Y G L D G K K D A R
15 caggtgaccagcaactccctcagtggtgacccaggaagacgggctggatgacccaggtg
Q V T S N S L S G T Q E D G L D D P R L
gaaaagctgtggcacaagggcgaagacctctgggaaattctccggcgaagaactggacaag
E K L W H K A K T S G K F S G E E L D K
ctctggcgggagttcctgcatcacaagagaaagttcacgagtacaacgtcctgctggag
20 L W R E F L H H K E K V H E Y N V L L E
accctgagcaggaccgaagaaatccacgagaacgtcattagcccctcggacctgagcgac
T L S R T E E I H E N V I S P S D L S D
atcaagggcagcgctcctgcacagcaggcacacggagctgaaggagaagctgcgcagcatc
I K G S V L H S R H T E L K E K L R S I
25 aaccagggcctggaccgctgcgcaggggtcagccaccagggctacagcactgaggctgag
N Q G L D R L R R V S H Q G Y S T E A E
ttcggaggagcccaggggtgattgacctgtgggacctggcgagtcggccaacctcacggac
F E E P R V I D L W D L A Q S A N L T D
aaggagctggaggcggtccgggaggagctcaagcacttcgaagccaaaatcgagaagcac
30 K E L E A F R E E L K H F E A K I E K H
aaccactaccagaagcagctggagattgctgcacgagaagctgaggcacgcagagagcggtg
N H Y Q K Q L E I A H E K L R H A E S V
ggcgacggcgagcgtgtgagccgcagccgcgagaagcacgccctgctggagggcgggacc
G D G E R V S R S R E K H A L L E G R T
35 aaggagctgggctacacggtgaagaagcatctgcaggacctgtccggcaggatctccaga
K E L G Y T V K K H L Q D L S G R I S R
gctcgcgccgagggcagaaacgggtgcacaccccgccgtcccagagcagtgcccacacag
A R A E A E T G A H P G R P R A V P T Q
tgcgacgtcccccccaacagccgcttcgattgcgcccctgacaaggccatcacccaggaa
40 C D V P P N S R F D C A P D K A I T Q E
cagtgcgaggcccgcggtgctgtctacatccctgcaaagcaggggctgcaggagagcccag
Q C E A R G C Y I P A K Q G L Q G A Q
atggggcagccctggtgcttcttcccacccagctacccagctacaagctggagaacctg
M G Q P W C F F P P S Y P S Y K L E N L
45 agctcctctgaaatgggctacacggccaccctgacctgaccacccccaccttcttcccc
S S S E M G Y T A T L T R T T P T F F P
aaggacatcctgacctgcggctggacgtgatgatggagactgagaaccgcctccacttc
K D I L T L R L D V M M E T E N R L H F
acgatcaaagatccagctaacaggcgctacgaggtgcccttgagaccccgctgtccac
50 T I K D P A N R R Y E V P L E T P R V H
agccgggcaccgtccccactctacagcggtggagttctccgaggagcccttcgggggtgatc
S R A P S P L Y S V E F S E E P F G V I
gtgcaccggcagctggacggccgctgctgtaacacgacgggtggcgcccctgttcttt
V H R Q L D G R V L L N T T V A P L F F
55 gcggaccagttccttcagctgtccacctcgctgccctcgagtatatcacaggcctcgcc
A D Q F L Q L S T S L P S Q Y I T G L A
gagcacctcagtcacctgatgtcagcaccagctggaccaggatcacccctgtggaaccgg
E H L S P L M L S T S W T R I T L W N R
gaccttgcgcccacgcccgggtgcgaacctctacgggtctcaccctttctacctggcgctg
60 D L A P T P G A N L Y G S H P F Y L A L
gaggacggcggggtcgccacacgggggtgttccctgctaacagcaatgccatggatgtggtc

E D G G S A H G V F L L N S N A M D V V
ctgcagccgagccctgccccttagctggaggctgcagaggtgggatcctggatgtctacatc
L Q P S P A L S W R S T G G I L D V Y I
5 ttccctgggcccagagcccaagagcgtgggtgcagcagtagctggacgttggtgggatacccg
F L G P E P K S V V Q Q Y L D V V G Y P
ttcatgccgccatactggggcctgggcttcacctgtgccgctggggctactcctccacc
F M P P Y W G L G F H L C R W G Y S S T
gctatcaccgcaggtgggtggagaacatgaccagggcccacttccccctggacgtccaa
A I T R Q V V E N M T R A H F P L D V Q
10 tggaacgacctggactacatggactcccgaggaggacttcacgttcaacaaggatggcttc
W N D L D Y M D S R R D F T F N K D G F
cgggacttcccgccatgggtgcaggagctgcaccagggcgccggcgctacatgatgatc
R D F P A M V Q E L H Q G G R R Y M M I
15 gtggatcctgccatcagcagctcgggcccctgccgggagctacaggccctacgacgagggt
V D P A I S S S G P A G S Y R P Y D E G
ctgcggaggggggttttcatcaccaacgagaccggccagccgctgattgggaaggtatgg
L R R G V F I T N E T G Q P L I G K V W
cccggtccactgccttccccgacttcaccaacccccacagccctggcctgggtgggaggac
P G S T A F P D F T N P T A L A W W E D
20 atggtagctgagttccatgaccaggtgcccttcgacggcttggtgattgacatgaacgag
M V A E F H D Q V P F D G L W I D M N E
ccttccaacttcatcagaggctctgaggacggctgccccacaatgagctggagaaccca
P S N F I R G S E D G C P N N E L E N P
ccctacgtgcctgggggtggtggggggaccctccaggcgccaccatctgtgcctccagc
25 P Y V P G V V G G T L Q A A T I C A S S
caccagtttctctccacacactacaacctgcacaacctctacggcctgaccgaagccatc
H Q F L S T H Y N L H N L Y G L T E A I
gcctcccacagggcgctggtgaaggctcgggggacacgcccatttgtgatctcccgctcg
A S H R A L V K A R G T R P F V I S R S
30 accttggctggccacggccgatacggccgactggacgggggacgtgtggagctcctgg
T F A G H G R Y A G H W T G D V W S S W
gagcagctcgccctcctccgtgccagaaatcctgcagtttaacctgctgggggtgcctctg
E Q L A S S V P E I L Q F N L L G V P L
35 gtcggggccgacgtctgcggcttccctgggcaacacctcagaggagctgtgtgtgcgctgg
V G A D V C G F L G N T S E E L C V R W
accagctgggggcttctaccccttcatgcggaaccacaacagcctgctcagctctgcc
T Q L G A F Y P F M R N H N S L L S L P
caggagccgtacagcttcagcgagccggcccagcaggccatgaggaaggccctcaccctg
Q E P Y S F S E P A Q Q A M R K A L T L
40 cgctacgcactcctccccacctctacacactgttccaccaggcccacgtcgcgggggag
R Y A L L Y L T L F H Q A H V A G E
accgtggcccgccctcttccctggagttcccaaggactctagcacctggactgtggac
T V A R P L F L E F P K D S S T W T V D
caccagctcctgtggggggaggccctgctcatcaccacagtgctccaggccgggaaggcc
45 H Q L L W G E A L L I T P V L Q A G K A
gaagtgactggctacttccccttgggcacatggtacgacctgcagacgggtgccaatagag
E V T G Y F P L G T W Y D L Q T V P I E
gcccttggcagcctccccacccccacctgcagctcccgtgagccagccatccacagcgag
A L G G S L P P P P A A P R E P A I H S E
50 gggcagtggtgacgtgcgggccccctggacaccatcaacgtccacctccgggctggg
G Q W V T L P A P L D T I N V H L R A G
tacatcatccccctgcaggggccctcacaaccacagagtcccgcagcagcccatg
Y I I P L Q G P G L T T T E S R Q Q P M
gccctggctgtggccctaaccaagggtggagaggcccgaggggagctgttctgggacgat
55 A L A V A L T K G G E A R G E L F W D D
ggagagagcctggaagtgtgtggagcgaggggccctacacacaggtcatcttctggccagg
G E S L E V L E R G A Y T Q V I F L A R
aataacacgatcgtgaatgagctgtgacgtgtgaccagtgagggagctggcctgcagctg
N N T I V N E L V R V T S E G A G L Q L
60 cagaaggtgactgtcctgggcgtggccacggcgccccagcaggtcctctccaacggtgtc
Q K V T V L G V A T A P Q Q V L S N G V

cctgtctccaacttcacctacagccccgacaccaaggtcctggacatctgtgtctcgctg
P V S N F T Y S P D T K V L D I C V S L
ttgatgggagagcagtttctcgtcagctggtgttgactcgag
L M G E Q F L V S W C -

5

Melanotransferrin signal sequence is italicized. Linker peptide is underlined.

FIGURE 4. Nucleotide and protein sequences of the RAP-IDU fusion

aagcttaccgccatgcggggccgagcggggctctgtggctgctcctggctctgcgacc
M R G P S G A L W L L L A L R T

5 . gtgctcggatcctactcgcgaggagaagaaccagcccaagcgtcccccgaacgcgagtc
V L G S Y S R E K N Q P K P S P K R E S
ggagaggagttccgcattggagaagttgaaccagctgtgggagaaggccagcgactgcat
G E E F R M E K L N Q L W E K A Q R L H
cttcctcccgtaggctggccgagctccacgctgatctgaagatacaggagagggacgaa
10 L P P V R L A E L H A D L K I Q E R D E
ctcgctggaagaaactaaagcttgacggcttgacgaagatggggagaaggaagcgaga
L A W K K L K L D G L D E D G E K E A R
ctcatagcaacctcaatgtcatcttggccaagtatggtctggacggaagaaggacgct
L I R N L N V I L A K Y G L D G K K D A
15 cggcaggtgaccagcaactccctcagtgccaccaggaagacgggctggatgacccagg
R Q V T S N S L S G T Q E D G L D D P R
ctggaaaagctgtggcacaaggcgaagacctctgggaaattctccggcgaagaactggac
L E K L W H K A K T S G K F S G E E L D
aagctctggcgagggttcctgcatacacaagagaaagttcacgagtacaacgtcctgctg
20 K L W R E F L H H K E K V H E Y N V L L
gagacctgagcaggacgaagaatccacgagaacgctcattagcccctcgacctgagc
E T L S R T E E I H E N V I S P S D L S
gacatcaagggcagcgtcctgcacagcaggcacacggagctgaaggagaagctgcgagc
D I K G S V L H S R H T E L K E K L R S
25 atcaaccagggcctggaccgctgcgagggtcagccaccagggctacagcactgaggct
I N Q G L D R L R R V S H Q G Y S T E A
gagttcgaggagcccagggtgattgacctgtgggacctggcgagtcgcccaacctcacg
E F E E P R V I D L W D L A Q S A N L T
gacaaggagctggaggcggttcggggaggagctcaagcacttcgaagccaaaatcgagaag
30 D K E L E A F R E E L K H F E A K I E K
cacaaccactaccagaagcagctggagattgcgcacgagaagctgaggcacgcagagagc
H N H Y Q K Q L E I A H E K L R H A E S
gtgggacgagcgagcgtgtgagccgcagccgcgagaagcacgccctgctggagggcg
V G D G E R V S R S R E K H A L L E G R
35 accaaggagctgggctacacgggtgaagaagcatctgcaggacctgtccggcaggatctcc
T K E L G Y T V K K H L Q D L S G R I S
agagctcgcgcgaggcagaaaccgggtgaggccccgcacctgggtgcatgtggacgcggcc
R A R A E A E T G E A P H L V H V D A A
cgcgcgctgtggccccctgcggcgcttctgaggagcacaggttctgcccccgctgcca
40 R A L W P L R R F W R S T G F C P P L P
cacagccagctgaccagtacgtcctcagctgggaccagcagctcaacctcgccatgtg
H S Q A D Q Y V L S W D Q Q L N L A Y V
ggcgccgtccctcaccgcggcatcaagcaggtccggaccactggctgctggagcttgtc
G A V P H R G I K Q V R T H W L L E L V
45 accaccaggggggtccactggacggggcctgagctacaacttcacccacctggacgggtac
T T R G S T G R G L S Y N F T H L D G Y
ttggaccttctcagggagaaccagctcctcccagggtttgagctgatgggcagcgctcg
L D L L R E N Q L L P G F E L M G S A S
ggccacttcactgactttgaggacaagcagcaggtgtttgagtgaaggacttggctctcc
50 G H F T D F E D K Q Q V F E W K D L V S
agcctggccaggagatacatcggtaggtacggactggcgcatgtttccaagtgaacttc
S L A R R Y I G R Y G L A H V S K W N F
gagacgtggaatgagccagaccaccagactttgacaacgtctccatgacatgcaaggc
E T W N E P D H H D F D N V S M T M Q G
55 ttcctgaactactacgatgcctgctcgagggtctgcgcgccgagccccgccctgagg
F L N Y Y D A C S E G L R A A S P A L R
ctgggaggccccggcgactccttccacacccaccgcgatccccgctgagctggggcctc
L G G P G D S F H T P P R S P L S W G L
ctgcgccactgccacgacggtaccaacttcttactggggaggcgggcgctgaggac
60 L R H C H D G T N F F T G E A G V R L D

tacatctccctccacaggaagggtgcgcgcagctccatctccatcctggagcaggagaag
 Y I S L H R K G A R S S I S I L E Q E K
 gtcgtcgcgcagcagatccggcagctcttccccaagttcgcggacacccccatttacaac
 V V A Q Q I R Q L F P K F A D T P I Y N
 5 gacgagggcgacccgctggtgggctggtccctgccacagccgtggaggggcgacgtgacc
 D E A D P L V G W S L P Q P W R A D V T
 tacgcgccatggtggtgaaggtcatcgcgcagcatcagaacctgctactggccaacacc
 Y A A M V V K V I A Q H Q N L L L A N T
 acctccgccttccctacgcgctcctgagcaacgacaatgccttccctgagctaccacccg
 10 T S A F P Y A L L S N D N A F L S Y H P
 cacccttcgcgcagcgcacgctcaccgcgcgcttccaggtcaacaacacccgcccgcg
 H P F A Q R T L T A R F Q V N N T R P P
 cacgtgcagctgttcgcgaagccggtcctcacggccatggggctgctggcgctgctggat
 H V Q L L R K P V L T A M G L L A L L D
 15 gaggagcagctctgggccgaagtgtcgcagggccgggacgctcctggacagcaaccacag
 E E Q L W A E V S Q A G T V L D S N H T
 gtgggctcctggccagcgcacccgccccagggcccgccgacgcctggcgcgccgcg
 V G V L A S A H R P Q G P A D A W R A A
 gtgctgatctacgcgagcgcagacacccgcgcaccccaaccgcagcgtcgcggtgacc
 20 V L I Y A S D D T R A H P N R S V A V T
 ctgcggtgcgcgggtgcccccgcccgccgctggtctacgtcacgcgctacctggac
 L R L R G V P P G P G L V Y V T R Y L D
 aacgggctctcagccccgacggcgagtgcgcgccctgggcccggcccgtcttccccacg
 N G L C S P D G E W R R L G R P V F P T
 25 gcagagcagttccggcgcatgcgcgcggctgaggacccggtggccgcggcgccccgcccc
 A E Q F R R M R A A E D P V A A A P R P
 ttaccgcggcgccgcctgacctgcgccccgcgctgcggctgccgtcgttttgctg
 L P A G G R L T L R P A L R L P S L L L
 gtgcacgtgtgtgcgcgccccgagaagccgccccgggcaggtcacgcggtccgcgcctg
 30 V H V C A R P E K P P G Q V T R L R A L
 cccctgacccaagggcagctggttctggtctggtcggtatgaacacgtgggctccaagtgc
 P L T Q G Q L V L V W S D E H V G S K C
 ctgtggacatacagatccagttctctcaggacggttaaggcgtacaccccggtcagcagg
 L W T Y E I Q F S Q D G K A Y T P V S R
 35 aagccatcgaccttaacctctttgtgttcagcccagacacaggtgctgtctctggctcc
 K P S T F N L F V F S P D T G A V S G S
 taccgagttcgagccctggactactgggccccgaccaggcccccttctcggaacctgtgccg
 Y R V R A L D Y W A R P G P F S D P V P
 tacctggaggtccctgtgccaaagaggcccccatccccgggcaatccatgactcgag
 40 Y L E V P V P R G P P S P G N P -

Melanotransferrin signal sequence is italicized. Linker peptide is underlined.

FIGURE 5. Nucleotide and protein sequences of the RAP-GDNF fusion

```

atgggggggttcttactcgcgaggagaagaaccagcccaagccgtccccgaaacgcgagttcc
  M G G S Y S R E K N Q P K P S P K R E S
5 ggagaggagttccgcatggagaagttgaaccagctgtgggagaaggcccagcgactgcat
  G E E F R M E K L N Q L W E K A Q R L H
cttctcccgtaggctggccgagctccacgctgatctgaagatacaggagagggacgaa
  L P P V R L A E L H A D L K I Q E R D E
ctgcctggaagaaactaaagcttgacggcttgacgaagatggggagaaggaagcgaga
10 L A W K K L K L D G L D E D G E K E A R
ctcatagcaacctcaatgtcatcttggccaagtatggtctggacgaaagaaggacgct
  L I R N L N V I L A K Y G L D G K K D A
cggcaggtgaccagcaactccctcagtggtgacccaggaagacgggctggatgacccagg
  R Q V T S N S L S G T Q E D G L D D P R
15 ctggaaaagctgtggcacaaggcgaagacctctgggaaattctccggcgaagaactggac
  L E K L W H K A K T S G K F S G E E L D
aagctctggcgggagttcctgcatcacaaagagaaagttcacgagtacaacgtcctgctg
  K L W R F L H H K E K V H E Y N V L L
gagaccctgagcaggaccgaagaaatccacgagaacgtcattagcccctcggacctgagc
20 E T L S R T E E I H E N V I S P S D L S
gacatcaagggcagcgctcctgcacagcaggcacacggagctgaaggagaagctgcgacgc
  D I K G S V L H S R H T E L K E K L R S
atcaaccagggcctggaccgcctgcgagggtcagccaccagggtacagcactgagggt
  I N Q G L D R L R R V S H Q G Y S T E A
25 gagttcgaggagcccagggtgattgacctgtgggacctggcgagtcgcccaacctcacg
  E F E E P R V I D L W D L A Q S A N L T
gacaaggagctggaggcggtccgggaggagctcaagcacttcgaagccaaaatcgagaag
  D K E L E A F R E E L K H F E A K I E K
cacaaccactaccagacgctggagattgcgacgagaagctgaggcacgcagagagc
30 H N H Y Q K Q L E I A H E K L R H A E S
gtgggagcagggcgagcgtgtgagccgcagccgcgagaagcacgccctgctggagggggcg
  V G D G E R V S R S R E K H A L L E G R
accaaggagctgggtacacgggtgaagaagcatctgcaggacctgtccggcaggatctcc
  T K E L G Y T V K K H L Q D L S G R I S
35 agagctcgggcccagggcagaaaccgggttcaccagataaacaatggcagtgcttcctaga
  R A R A E A E T G S P D K Q M A V L P R
agagagcggaatcggcaggctgcagctgcccaaccagagaattccagaggaaaaggtcgg
  R E R N R Q A A A A N P E N S R G K G R
agagccagaggggcaaaaaccggggtgtgtcttaactgcaatacatttaaatgtcact
40 R G Q R G K N R G C V L T A I H L N V T
gacttgggtctgggtatgaaaccaaggaggaactgatttttaggtactgcagcggtctt
  D L G L G Y E T K E E L I F R Y C S G S
tgcatgagctgagacaacgtacgacaaaatattgaaaaacttatccagaaatagaagg
  C D A A E T T Y D K I L K N L S R N R R
45 ctggtgagtgacaaagtagggcaggcatgttgacacccatcgcccttgatgatgacctg
  L V S D K V G Q A C C R P I A F D D D L
tcgttttttagatgataacctggtttaccatattctaagaaagcattccgctaaaaggtgt
  S F L D D N L V Y H I L R K H S A K R C
50 ggatgtatctgatctaga
  G C I -

```

Linker peptide is underlined.

Figure 6. Characterization of the RAP-GAA fusion.

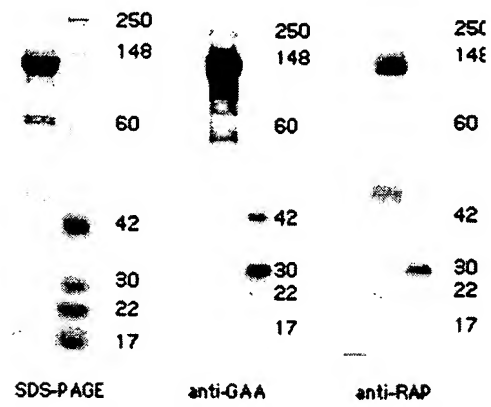


Figure 7. Assay for complex oligosaccharides on RAP-GAA

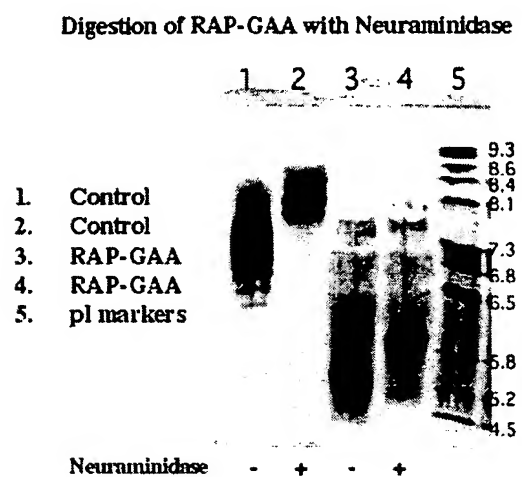


Figure 8. Assay for high-mannose oligosaccharides on RAP-GAA

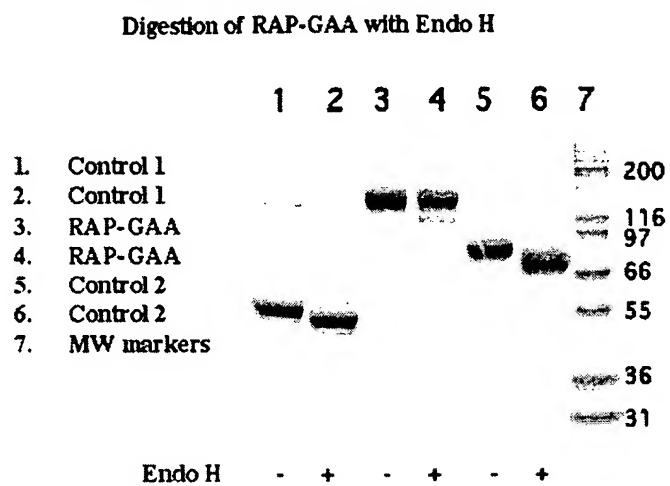
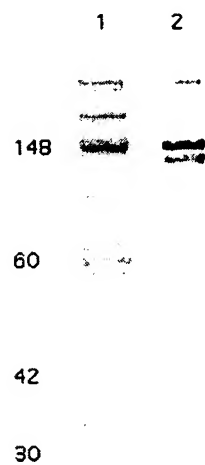


Figure 9. Characterization of RAP-IDU fusion



1. SDS-PAGE
2. Anti-Iduronidase Western

Binding of RAP and RAP-lysosomal enzyme fusion to LRP.






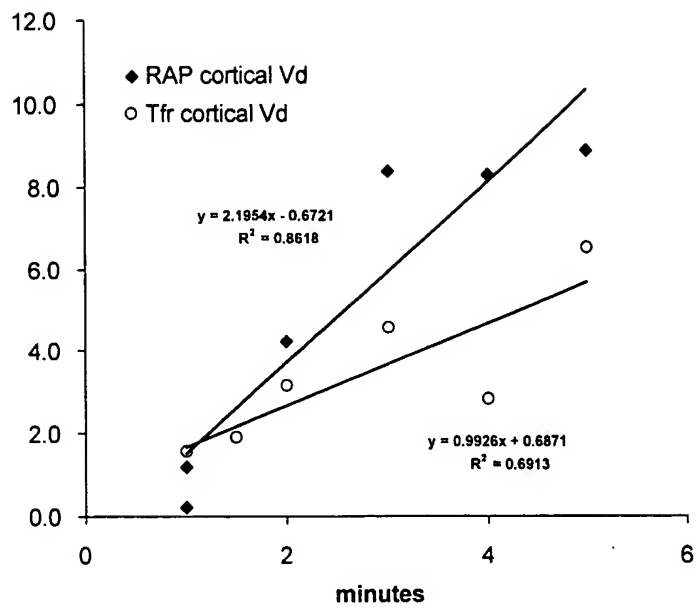
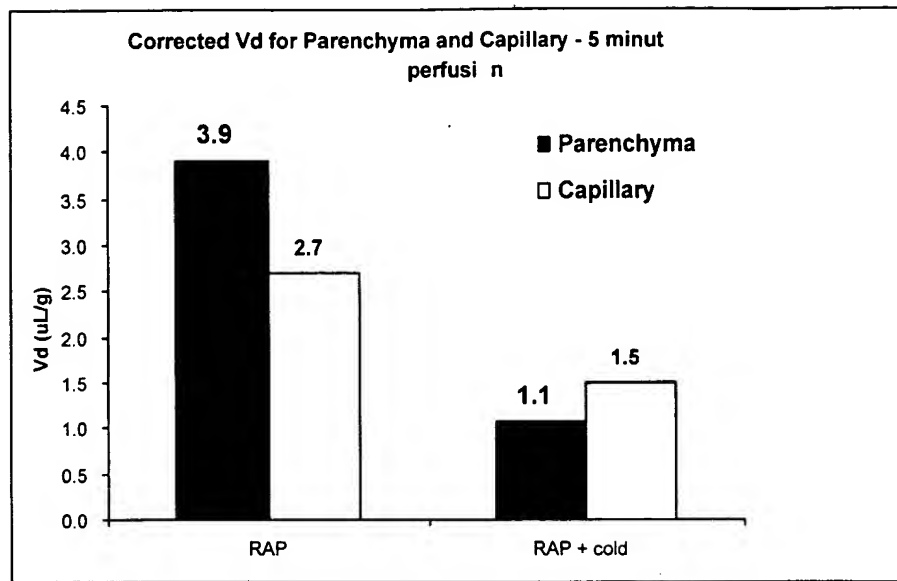
	None	RAP	RAP-Idu (Purified)	RAP-Idu (Medium)
Anti-RAP				
Anti-Idu				

FIGURE 10



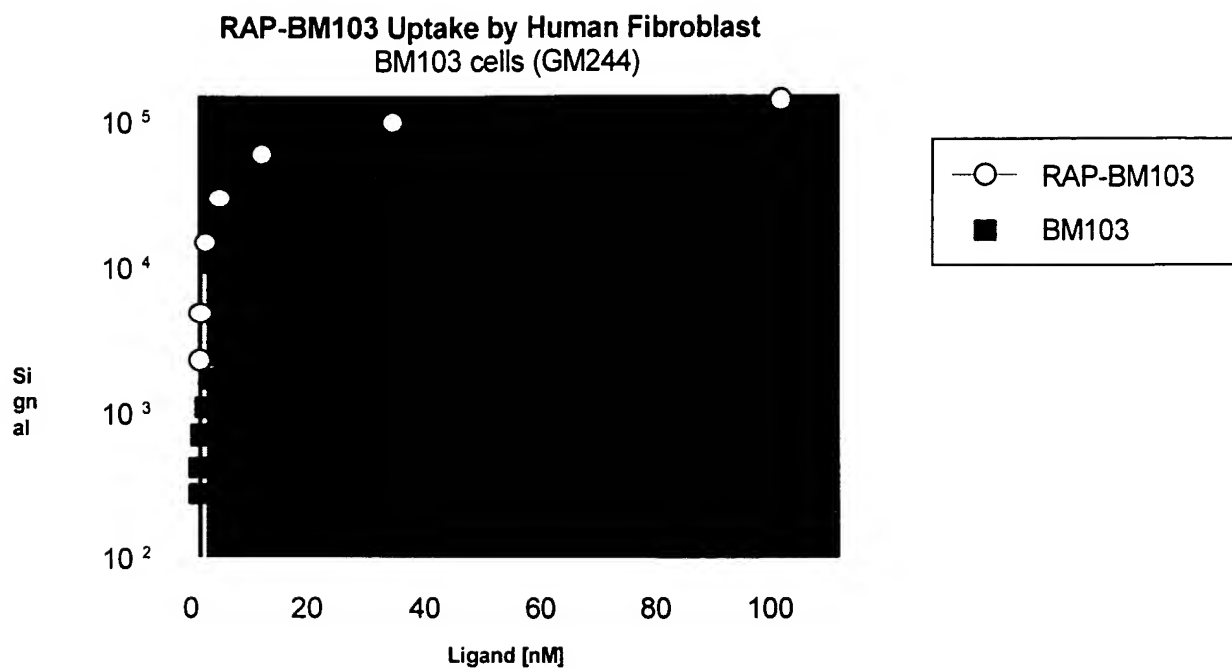
Corrected V_d vs. Perfusion time.

FIGURE 11.



Distribution of RAP between brain capillary endothelium and brain parenchyma.

FIGURE 12.



RAP-BM103

Parameter	Value	Std. Error
Vmax	160806 .4864	5540 .7619
Km	18 .6316	1 .8955

BM103

Parameter	Value	Std. Error
Vmax	2691 .6376	112 .1342
Km	1 .6615	0 .2002

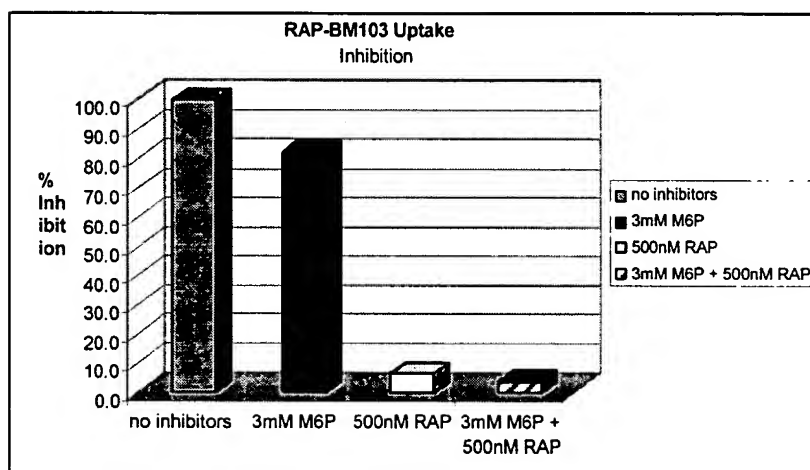


FIGURE 13

FIGURE 14. Multiple alignment of amino acid sequences of RAP from different species.

human	1	-----MAPRRVRSFLRGLPA	LL	LI	LI	FL	GP	WPAAS	HGGKYSREK
mouse	1	MGGPTRPSPVSLALQRM	APRRERVSTL	PRLQLLV	LL	LI	PLMLV	PQPIAGH	HGGKYSREK
5 rat	1	-----LRDRVSTL	PRLQLLV	LL	LI	PLLLV	PQPIAGH	HGGKYSREK	
chicken	1	-----MGATRT	VAVMAAFLAVST	RA	SK	YTRFA			
zebrafish	1	-----							MAGKYSREM
fruit fly	1	-----MVR	SALVVA	AI	SVI	I	ALQ	VDADKQ	SKYSKEA
10 mosquito	1	-----ELC	PIARRKRG	IKHT	LT	MPLFTR	CVIVFT	VLVCNHV	VQSEKAHSKY
flatworm	1	-----							MRNHFFLL
consensus	1		t		1	11	lml		hggkysre
human	40	-----	QPKPSPKRESCE	FRMEKLNQ	LWEKAQR	LHLP	PVRLAELH	ADLKI	QERDE
15 mouse	61	-----	NEPEMAAKRESCE	FRMEKLNQ	LWEKAQR	LHLS	PVRLAELH	SDDLKI	QERDE
rat	40	-----	NEPEMAAKRESCE	FRMEKLNQ	LWEKAQR	LHLS	PVRLAELH	SDDLKI	QERDE
chicken	29	-----	NEGLADAKFREAGE	FRVVR	LNQVWEKAQR	LQLS	AVKLAE	LHSD	LKIQEKDE
zebrafish	10	-----	NEKNASD	SNNQVEFR	IAKLNOVWEKA	IRMOI	APVRL	SELHSD	LKIQEKDE
fruit fly	37	NDPHFQOVK	QEKYDPDF	SIQR	FERMAKLN	LVAKAQR	NR	LTEP	RLKSLY
20 mosquito	48	SKHANALPDSE	IYEPDF	NIQR	FERMAKLN	LVTKAQR	HR	LTEP	RLKSLY
flatworm	10	-----	FLLVIGSA	HNKKTQ	YTER	RL	FIYEKALQ	HVTDRQ	NLARLEKEISGYDAIY
consensus	61		ne	kr	g	efRmeklNqvweKAqrl	lspvrLaeLhsdLkiqekde		
human	91	IAWKKLKL	DGLDE	DGEKEAK	LI	RNLNV	ILAKYGLD	GKKDARQ	VTSN-----
mouse	112	LNWKKLKV	EGLDK	DGEKEAK	LI	HNLN	VILARYGLD	GKKDAQ	MVHSN-----
rat	91	LNWKKLKV	EGLDG	DGEKEAK	LI	VNLNV	ILARYGLD	GKKDTQ	TVHSN-----
chicken	80	LSWKKLKA	EGLGE	DGEKEAK	LRNR	INVI	TKYGM	YKKDSH	LTDTN-----
zebrafish	61	QWKKLKAEGM	EDGER	EAKLRN	EN	ILAKY	GMDGKK	LTRTLD	SNR-----
30 fruit fly	96	IAWKKLNS	CHK	KDGL	KADEL	RRK	IGIMSS	DLEHF	DTQDTEKL
mosquito	107	TYNOLN	---EK	KDGL	KAELN	KVS	IMST	GILEHF	DTQDPEKY
flatworm	61	IASKSNR	---QGT	QGTKEID	TD	DK	GKI	EKYGIE	KAVLAFKEKY
consensus	121	l	wKklk	egld	dgekeaklrrnlnv	ilakYgldgk	kd	v	sn
human	144	-----	GLD	DPRLEKLW	HKA	KTSGKFS	GEELDKLW	REFL	HHKEK
mouse	165	-----	DELG	DPRLEKLW	HKA	KTSGKFS	SEELDKLW	REFL	HYKEKI
rat	144	-----	DELG	DPRLEKLW	HKA	KTSGKFS	SEELDKLW	REFL	HYKEKI
chicken	134	-----	LTLD	DPRLEKLW	SKA	KTSGKFS	DEELDKLW	REFK	HHKEKI
40 zebrafish	117	-----	LTFD	DPRLDKLW	NKA	RTSGKFS	DEELQTLH	REFCH	HKDKI
fruit fly	155	HRNKS	LFK	KKLN	KLWDA	EA	SG	ETA	EELKS
mosquito	165	TYKNK	SLFK	KKLN	KLWDA	EA	SG	ETA	EELKS
flatworm	118	--LPSG	KFT	QNLQ	KLWSQ	QNGK	---QKEI	NA	HGELKEVEQ
consensus	181		d	DprLekLW	kAktsgkFs	eELdkLwrEf	hhkeKiheYnv	lletls	
human	195	-----	STEEI	HEN	MISPS	DL	S-----	DIKGS	VI
mouse	216	-----	PAEEGY	EN	LLSP	S	DMA-----	HIKSD	TL
rat	195	-----	PAEEGY	EN	LLSP	S	DMT-----	HIKSD	TL
50 chicken	185	-----	STEEI	HKKV	IN	PS	EN-----	PVKEE	V
zebrafish	168	-----	STEEI	HKKV	IN	PS	EN-----	PVKEE	V
fruit fly	209	-----	TVDT	DKHENA	IN	TE	LD	TYN	LISND
mosquito	224	GGAAGQGS	R	DD	DALL	NA	VND	E	HD
flatworm	171	-----	K	---V	PHENS	I	Q	DIES	-----
consensus	241		r	ee	henvispsdl			ik	1

	human	229	RSINQGLDRLRRVSHQGYSTEA	EFEEPRVIDLWDLAQSA	FLIDKELEA	FEELKHFEAK
	mouse	250	RSINQGLDRLRKVSHQGYG	TTEFEEPRVIDLWDLAQSA	NFTEKELESF	FEELKHFEAK
	rat	229	RSINQGLDRLRKVSHQGYGPAT	FEFEEPRVIDLWDLAQSA	NFTEKELESF	FEELKHFEAK
	chicken	219	RSINQGFERLRKVSHQGYDAT	SEFEEPRVIDLWMAKSA	NFTEKELESF	FEELKHFEAK
5	zebrafish	201	FDLNQGFERLRKITHEGYTDD	SEFEEPRVIDELKEMAKRS	ILSEDELD	LKEELRHFFTK
	fruit fly	261	TGIKDHYDRLERLVSSPHQ	QDIEIKVQGLERVAAS	NFTVKELES	IKTELHFFESR
	mosquito	284	REIRDNEDRIDRIASKPKQ	DEVEIKVQGLERVAAS	DSADEIASL	KVELLEYESR
	flatworm	197	RELNDHLEEVHKKVTSEEF	FPFNEPRVKRLWKLACENEKLI	PHIELSVLKDEI	SHFESQ
	consensus	301	rsinqgldrlrrvshqgy s	teFeEPrVidLWdlAqsa	nftekELesfreELkhfEak	
10						
	human	288	IEKHNHYQKOLEISH	HEKLRHAES	-----	VGDGERVSRSEKHALLEGSTKELGYTVKKHL
	mouse	309	IEKHNHYQKOLEISH	OKLKHVES	-----	IGDPEHISRNKEKYVLEEKTRELGYKVKKHL
	rat	288	IEKHNHYQKOLEISH	OKLKHVES	-----	IGDPEHISRNKEKYVLEEKTRELGYKVKKHL
	chicken	278	IEKHNHYQKOLEISH	HEKLRHTEG	-----	TGDKHEHLNRNREKYAMLEEKTRELGYKVKKHL
15	zebrafish	260	VEKHCHYQOLEISH	OKLKHVEA	-----	LGDEDHLMRNREKYNTLAEKAREMGYKVKKHL
	fruit fly	319	LLKLRLHAEHAL	QREKYNGEK	-----	VKDKSSREEMEDQLKQTRKVENLQ
	mosquito	342	LLKLRLHAEHAL	SLKHKHS	-----	DAKADTHKLMDNIAKQTRKVENMQ
	flatworm	255	EKKIEFHKVFFV	ANSCKPKGKNEEVSRLQ	EDAEERGKDKSQVYENLELSIKHE	LNKKA
	consensus	361	ieKhnhyqkqleisheklkhve			vgd ehv rnreky lleektkelgykvkchl
20						
	human	343	QDLSSRIS	SR--ARHNEL		
	mouse	364	QDLSSRIS	SR--ARHNEL		
	rat	343	QDLSSRIS	SR--ARHNEL		
25	chicken	333	QDLSSRIS	QSG-LQHNEL		
	zebrafish	315	QDLNKLIS	SNGLQHNEL		
	fruit fly	367	ENIEKTIF	AK----HTEL		
	mosquito	388	EEVERRIF	AK----HSEL		
	flatworm	315	RKLEKYIEEKII	IRREL		
30	consensus	421	qdlss risr	HnEL		

Figure 15: Amino Acid Sequence Of Human RAP (SEQ ID NO:1)

TyrSerArgGluLysAsnGlnProLysProSerProLysArgGluSer
GlyGluGluPheArgMetGluLysLeuAsnGlnLeuTrpGluLysAla
GlnArgLeuHisLeuProProValArgLeuAlaGluLeuHisAlaAsp
LeuLysIleGlnGluArgAspGluLeuAlaTrpLysLysLeuLysLeu
AspGlyLeuAspGluAspGlyGluLysGluAlaArgLeuIleArgAsn
LeuAsnValIleLeuAlaLysTyrGlyLeuAspGlyLysLysAspAla
ArgGlnValThrSerAsnSerLeuSerGlyThrGlnGluAspGlyLeu
AspAspProArgLeuGluLysLeuTrpHisLysAlaLysThrSerGly
LysPheSerGlyGluGluLeuAspLysLeuTrpArgGluPheLeuHis
HisLysGluLysValHisGluTyrAsnValLeuLeuGluThrLeuSer
ArgThrGluGluIleHisGluAsnValIleSerProSerAspLeuSer
AspIleLysGlySerValLeuHisSerArgHisThrGluLeuLysGlu
LysLeuArgSerIleAsnGlnGlyLeuAspArgLeuArgArgValSer
HisGlnGlyTyrSerThrGluAlaGluPheGluGluProArgValIle
AspLeuTrpAspLeuAlaGlnSerAlaAsnLeuThrAspLysGluLeu
GluAlaPheArgGluGluLeuLysHisPheGluAlaLysIleGluLys
HisAsnHisTyrGlnLysGlnLeuGluIleAlaHisGluLysLeuArg
HisAlaGluSerValGlyAspGlyGluArgValSerArgSerArgGlu
LysHisAlaLeuLeuGluGlyArgThrLysGluLeuGlyTyrThrVal
LysLysHisLeuGlnAspLeuSerGlyArgIleSerArgAlaArgHis
AsnGluLeu

Figure 16: Amino Acid Sequence of the 28 kD RAP polypeptide (SEQ ID NO:2)

ProArgLeuGluLysLeuTrpHisLysAlaLysThrSerGlyLysPhe
SerGlyGluGluLeuAspLysLeuTrpArgGluPheLeuHisHisLys
GluLysValHisGluTyrAsnValLeuLeuGluThrLeuSerArgThr
GluGluIleHisGluAsnValIleSerProSerAspLeuSerAspIle
LysGlySerValLeuHisSerArgHisThrGluLeuLysGluLysLeu
ArgSerIleAsnGlnGlyLeuAspArgLeuArgArgValSerHisGln
GlyTyrSerThrGluAlaGluPheGluGluProArgValIleAspLeu
TrpAspLeuAlaGlnSerAlaAsnLeuThrAspLysGluLeuGluAla
PheArgGluGluLeuLysHisPheGluAlaLysIleGluLysHisAsn
HisTyrGlnLysGlnLeuGluIleAlaHisGluLysLeuArgHisAla
GluSerValGlyAspGlyGluArgValSerArgSerArgGluLysHis
AlaLeuLeuGluGlyArgThrLysGluLeuGlyTyrThrValLysLys
HisLeuGlnAspLeuSerGlyArgIleSerArgAlaArgHisAsnGlu
Leu